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EXAMINER	
COLUCCI, MICHAEL C	

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2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/578,640	MARTIN, SVEN C.	
	Examiner	**Art Unit**	
	MICHAEL C. COLUCCI	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Renarks, filed 07/13/2009, with respect to the rejection(s) of claim(s) 1, 6, and 11 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Papineni et al US 5991710 A (hereinafter Papineni). Re "calculating a probability that the phrase is mapped to a semantic tag from a list of unordered semantic tags", Papineni explicitly teaches the identification of a sequences of phrases/sentences containing a words, wherein unordered words are identified and linked/mapped to a phrase (Papineni Col. 5 lines 45 – Col. 6 line 50). Further, Papineni teaches the tagging of high priority words within unordered sets of words (Papineni Col. 3 line 66 – Col. 4 line 11). The semantic analysis interpreter and probability expectation maximization algorithm taught by Brill in view of Schabes render obvious the combination of Papineni to allow for the identification of all words found within a set of words regardless of order/sequence of words in a phrase or group of words (Col. 5 lines 45 – Col. 6 line 50).

Further, the teachings of expectation maximization algorithm applied to semantic alanysis are consistent with the present invention's expectation maximization algorithm applied to tag sequences (k) (present invention spec. page 10). Additionally, Papineni teaches tag sequences like the present invention (present invention spec. page 10) also

consistent with a sequence of words/phrases tagged on an unordered basis (Col. 5 lines 45 – Col. 6 line 50).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 4-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brill et al. US 20020169596 A1 (hereinafter Brill) in view of Schabes et al. US 5537317 A (hereinafter Schabes).

Re claim 1, Brill teaches a method carried out by a processor, comprising:

extracting a phrase from a training corpus ([0021], semantic interpreter analyzing sentences from a corpus);

calculating a probability that the phrase is mapped to a semantic tag ([0025], semantic interpreter mapping components) from a list of unordered semantic tags;

mapping the phrase to the semantic tag ([0033-0034], highest score for learning set) with the highest mapping probability ([0028] maximization algorithm);

generating a mapping table containing the phrase and its corresponding semantic tag ([0025], semantic interpreter mapping components)

However Brill fails to teach calculating a probability that the phrase is mapped to a semantic tag from a list of unordered semantic tags

Schabes teaches past limitations and an improvement upon them, wherein Schabes teaches that in the past, in order to ascertain proper usage, the grammaticality of a sentence was computed as the probability of this sentence to occur in English. Such statistical approach assigns high probability to grammatically correct sentences, and low probability to ungrammatical sentences. The statistical is obtained by training on a collection of English sentences, or a training corpus. The corpus defines correct usage. As a result, when a sentence is typed in to such a grammar checking system, the probability of the entire sentence correlating with the corpus is computed. It will be appreciated in order to entertain the entire English vocabulary, about 60,000 words, a corpus of at several hundred trillion words must be used. Furthermore, a comparable number of probabilities must be stored on the computer. Thus the task of analyzing entire sentences is both computationally and storage intensive. In order to establish correct usage in the Subject System, it is the probability of a sequence of parts of speech which is derived. For this purpose, one can consider that there are between 100 and 400 possible parts of speech depending how sophisticated the system is to be. This translates to a several million word training corpus as opposed to several hundred trillion. This type of analysis can be easily performed on standard computing platforms including the ones used for word processing. Thus in the subject system, a sentence is first broken up into parts of speech. For instance, the sentence "I heard this band play"

is analyzed as follows: PRONOUN, VERB, DETERMINER, NOUN, VERB. The probability of this part of speech sequence, is determined by comparing the sequence to the corpus. This is also not feasible unless one merely consider the so-called tri-grams. Tri-grams are triple of parts of speech which are adjacent in the input sentence. Analyzing three adjacent parts of speech is usually sufficient to establish correctness; and it the probability of these tri-grams which is utilized to establish that a particular sentence involves correct usage. Thus rather than checking the entire sentence, the probability of three adjacent parts of speech is computed from the training corpus (Schabes Col. 8 lines 13-51).

Further, Schabes teaches that the entries of a dictionary are selected and ranked based on the part of speech assigned to the given word in context. The entries corresponding to the word in context are first selected. The other entries not relevant to the current context are still available at the request of the user. The part of speech of the given word in context is disambiguated with the part of speech tagger described above. By way of illustration, assuming the word "left" in the sentence "He left a minute ago", the part of speech tagger assigns the tag "verb past tense" for the word "left" in that sentence. For this case, the Subject System selects the entries for the verb "leave" corresponding to the usage of "left" in that context and then selects the entries for "left" not used in that context, in particular the ones for "left" as an adjective, as an adverb and as a noun (Schabes Col. 24 lines 45-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill to incorporate calculating a probability

that the phrase is mapped to a semantic tag from a list of semantic tags as taught by Schabes to allow for the tagging of semantic portions of a sentence (such as parts of speech) in order to prioritize (i.e. the best ranking/probability) semantic tags within a sentence to maintain the proper context based on adjacent tags in a sentence (Schabes Col. 24 lines 45-60).

However, Brill in view of Schabes fails to teach the use of semantic unordered lists.

Papineni teaches the identification of word mapping relative to an unordered list of grammatical components, wherein word-set feature functions formed and supported by the translation model of the present invention are characterized such that s and t are unordered sets of words. That is, s is in S if all n words of s are in S, regardless of the order in which they occur in S. Likewise, t is in T if all n words of t are in T, regardless of the order in which they occur in T. An example of a word-set feature function or operation performed by the model in the ATIS domain would be searching for the existence of the unordered words "departing" and "after" among the formal sentence candidates (stored in target language candidate store 30), given an English sentence having the unordered words "leave" and "after" contained therein. For instance given the sample English sentences (E.sub.1 through E.sub.6) and the sample formal sentences (F.sub.1 through F.sub.5) above, the word-set feature function fires on E.sub.1 and F.sub.1, thus, identifying the pair (E.sub.1, F.sub.1). The same is true for the pair (E.sub.2, F.sub.1) (Col. 5 lines 45 – Col. 6 line 50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill in view of Schabes to incorporate calculating a probability that the phrase is mapped to a semantic tag from a list of unordered semantic tags as taught by Papineni to allow for the identification of all words found within a set of words regardless of order/sequence of words in a phrase or group of words Col. 5 lines 45 – Col. 6 line 50).

Re claims 6, and 11, Brill teaches a processor executing a computer program product to:

calculate a mapping probability that a semantic tag of a set of candidate semantic tags is assigned to a phrase ([0025]), wherein the calculation of the mapping probability is performed by means of a statistical procedure based on a set of phrases constituting a corpus of sentences ([0024]), each of the phrases having assigned a set of candidate semantic tags ([0028]).

generate a mapping table from the performed mapping ([0035])

However, Brill fails to teach mapping probability that is performed by means of a statistical procedure based on a set of phrases

However Brill fails to teach calculating a probability from a list of semantic tags

Schabes teaches past limitations and an improvement upon them, wherein Schabes teaches that in the past, in order to ascertain proper usage, the grammaticality of a sentence was computed as the probability of this sentence to occur in English. Such statistical approach assigns high probability to grammatically correct sentences,

and low probability to ungrammatical sentences. The statistical is obtained by training on a collection of English sentences, or a training corpus. The corpus defines correct usage. As a result, when a sentence is typed in to such a grammar checking system, the probability of the entire sentence correlating with the corpus is computed. It will be appreciated in order to entertain the entire English vocabulary, about 60,000 words, a corpus of at several hundred trillion words must be used. Furthermore, a comparable number of probabilities must be stored on the computer. Thus the task of analyzing entire sentences is both computationally and storage intensive. In order to establish correct usage in the Subject System, it is the probability of a sequence of parts of speech which is derived. For this purpose, one can consider that there are between 100 and 400 possible parts of speech depending how sophisticated the system is to be. This translates to a several million word training corpus as opposed to several hundred trillion. This type of analysis can be easily performed on standard computing platforms including the ones used for word processing. Thus in the subject system, a sentence is first broken up into parts of speech. For instance, the sentence "I heard this band play" is analyzed as follows: PRONOUN, VERB, DETERMINER, NOUN, VERB. The probability of this part of speech sequence, is determined by comparing the sequence to the corpus. This is also not feasible unless one merely consider the so-called tri-grams. Tri-grams are triple of parts of speech which are adjacent in the input sentence. Analyzing three adjacent parts of speech is usually sufficient to establish correctness; and it the probability of these tri-grams which is utilized to establish that a particular sentence involves correct usage. Thus rather than checking the entire sentence, the

probability of three adjacent parts of speech is computed from the training corpus (Schabes Col. 8 lines 13-51).

Further, Schabes teaches that the entries of a dictionary are selected and ranked based on the part of speech assigned to the given word in context. The entries corresponding to the word in context are first selected. The other entries not relevant to the current context are still available at the request of the user. The part of speech of the given word in context is disambiguated with the part of speech tagger described above. By way of illustration, assuming the word "left" in the sentence "He left a minute ago", the part of speech tagger assigns the tag "verb past tense" for the word "left" in that sentence. For this case, the Subject System selects the entries for the verb "leave" corresponding to the usage of "left" in that context and then selects the entries for "left" not used in that context, in particular the ones for "left" as an adjective, as an adverb and as a noun (Schabes Col. 24 lines 45-60).

Schabes also teaches well known previous techniques, wherein in the past, in order to ascertain proper usage, the grammaticality of a sentence was computed as the probability of this sentence to occur in English. Such statistical approach assigns high probability to grammatically correct sentences, and low probability to ungrammatical sentences. The statistical is obtained by training on a collection of English sentences, or a training corpus. The corpus defines correct usage. As a result, when a sentence is typed in to such a grammar checking system, the probability of the entire sentence correlating with the corpus is computed. It will be appreciated in order to entertain the entire English vocabulary, about 60,000 words, a corpus of at several hundred trillion

words must be used. Furthermore, a comparable number of probabilities must be stored on the computer. Thus the task of analyzing entire sentences is both computationally and storage intensive (Schabes Col. 8 lines 12-28).

Further, Schabes overcomes previous techniques, wherein rather than comparing the above mentioned probabilities, in a preferred embodiment, the subject system compares the geometric average of these probabilities by taking into account their word lengths, i.e. by comparing the logarithm of P1 divided by the number of words in S1, and the logarithm of P2 divided by the number of words in S2. This is important in cases where a single word may be confused with a sequence of words such as "maybe" and "may be". Directly comparing the probabilities of the part of speech sequences would favor shorter sentences instead of longer sentences, an not necessarily correct result, since the statistical language model assigns lower probabilities to longer sentences (Schabes Col. 9 lines 55-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill to incorporate mapping probability that is performed by means of a statistical procedure based on a set of phrases and semantic tags assigned to a phrase as taught by Schabes to allow for the recognition of parts of speech and individual in addition to the identification of sentences/phrases, wherein higher/lower probabilities are assigned to sentences and the length of the sentences in an unsupervised or even supervised system (Schabes Col. 9 lines 55-67) and to further allow for the tagging of semantic portions of a sentence (such as parts of speech) in order to prioritize (i.e. the best ranking/probability) semantic tags within a

sentence to maintain the proper context based on adjacent tags in a sentence (Schabes Col. 24 lines 45-60).

However, Brill in view of Schabes fails to teach the use of semantic unordered lists.

Papineni teaches the identification of word mapping relative to an unordered list of grammatical components, wherein word-set feature functions formed and supported by the translation model of the present invention are characterized such that s and t are unordered sets of words. That is, s is in S if all n words of s are in S, regardless of the order in which they occur in S. Likewise, t is in T if all n words of t are in T, regardless of the order in which they occur in T. An example of a word-set feature function or operation performed by the model in the ATIS domain would be searching for the existence of the unordered words "departing" and "after" among the formal sentence candidates (stored in target language candidate store 30), given an English sentence having the unordered words "leave" and "after" contained therein. For instance given the sample English sentences (E.sub.1 through E.sub.6) and the sample formal sentences (F.sub.1 through F.sub.5) above, the word-set feature function fires on E.sub.1 and F.sub.1, thus, identifying the pair (E.sub.1, F.sub.1). The same is true for the pair (E.sub.2, F.sub.1) (Col. 5 lines 45 – Col. 6 line 50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill in view of Schabes to incorporate calculating a probability that the phrase is mapped to a semantic tag from a list of

unordered semantic tags as taught by Papineni to allow for the identification of all words found within a set of words regardless of order/sequence of words in a phrase or group of words Col. 5 lines 45 – Col. 6 line 50).

Re claims 7 and 12, Brill teaches the method according to claim I, for each phrase further comprising calculating a set of mapping probabilities ([0025]), providing the probability for each semantic tag of the set of candidate semantic tags being assigned to the phrase ([0028]).

However, Brill fails to teach providing the probability for each semantic tag of the set of candidate semantic tags

Schabes teaches well known previous techniques, wherein in the past, in order to ascertain proper usage, the grammaticality of a sentence was computed as the probability of this sentence to occur in English. Such statistical approach assigns high probability to grammatically correct sentences, and low probability to ungrammatical sentences. The statistical is obtained by training on a collection of English sentences, or a training corpus. The corpus defines correct usage. As a result, when a sentence is typed in to such a grammar checking system, the probability of the entire sentence correlating with the corpus is computed. It will be appreciated in order to entertain the entire English vocabulary, about 60,000 words, a corpus of at several hundred trillion words must be used. Furthermore, a comparable number of probabilities must be

stored on the computer. Thus the task of analyzing entire sentences is both computationally and storage intensive (Schabes Col. 8 lines 12-28).

Further, Schabes overcomes previous techniques, wherein rather than comparing the above mentioned probabilities, in a preferred embodiment, the subject system compares the geometric average of these probabilities by taking into account their word lengths, i.e. by comparing the logarithm of P1 divided by the number of words in S1, and the logarithm of P2 divided by the number of words in S2. This is important in cases where a single word may be confused with a sequence of words such as "maybe" and "may be". Directly comparing the probabilities of the part of speech sequences would favor shorter sentences instead of longer sentences, an not necessarily correct result, since the statistical language model assigns lower probabilities to longer sentences (Schabes Col. 9 lines 55-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill to incorporate the probability for each semantic tag of the set of candidate semantic tags as taught by Schabes to allow for the recognition of parts of speech and individual in addition to the identification of sentences/phrases, wherein higher/lower probabilities are assigned to sentences and the length of the sentences in an unsupervised or even supervised system (Schabes Col. 9 lines 55-67).

Re claims 8 and 13, Brill teaches the method according to claim 2, further comprising determining one semantic tag of the set of candidate semantic tags ([0025])

having the highest mapping probability of the set of mapping probabilities and mapping the one semantic tag to the phrase ([0024])

However, Brill fails to teach determining one semantic tag of the set of candidate semantic tags having the highest mapping probability

Schabes teaches well known previous techniques, wherein in the past, in order to ascertain proper usage, the grammaticality of a sentence was computed as the probability of this sentence to occur in English. Such statistical approach assigns high probability to grammatically correct sentences, and low probability to ungrammatical sentences. The statistical is obtained by training on a collection of English sentences, or a training corpus. The corpus defines correct usage. As a result, when a sentence is typed in to such a grammar checking system, the probability of the entire sentence correlating with the corpus is computed. It will be appreciated in order to entertain the entire English vocabulary, about 60,000 words, a corpus of at several hundred trillion words must be used. Furthermore, a comparable number of probabilities must be stored on the computer. Thus the task of analyzing entire sentences is both computationally and storage intensive (Schabes Col. 8 lines 12-28).

Further, Schabes overcomes previous techniques, wherein rather than comparing the above mentioned probabilities, in a preferred embodiment, the subject system compares the geometric average of these probabilities by taking into account their word lengths, i.e. by comparing the logarithm of P1 divided by the number of words in S1, and the logarithm of P2 divided by the number of words in S2. This is important in cases where a single word may be confused with a sequence of words such as

"maybe" and "may be". Directly comparing the probabilities of the part of speech sequences would favor shorter sentences instead of longer sentences, an not necessarily correct result, since the statistical language model assigns lower probabilities to longer sentences (Schabes Col. 9 lines 55-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill to incorporate the probability for each semantic tag of the set of candidate semantic tags as taught by Schabes to allow for the recognition of parts of speech and individual in addition to the identification of sentences/phrases, wherein higher/lower probabilities are assigned to sentences and the length of the sentences in an unsupervised or even supervised system (Schabes Col. 9 lines 55-67).

Re claims 4, 9, and 14, Brill teaches the method according to claim 1, wherein the statistical procedure comprises an expectation maximization algorithm ([0028]).

Re claims 5, 10, and 15, Brill teaches the method according to claim 3 or 4, further comprising storing of performed mappings between a candidate semantic tag ([0025]) and a phrase in form of a mapping table ([0024]) in order to derive a grammar being applicable to unknown sentences or unknown phrases.

However, Brill fails to teach deriving a grammar being applicable to unknown sentences or unknown phrases

Schabes teaches well known previous techniques, wherein in the past, in order to ascertain proper usage, the grammaticality of a sentence was computed as the probability of this sentence to occur in English. Such statistical approach assigns high probability to grammatically correct sentences, and low probability to ungrammatical sentences. The statistical is obtained by training on a collection of English sentences, or a training corpus. The corpus defines correct usage. As a result, when a sentence is typed in to such a grammar checking system, the probability of the entire sentence correlating with the corpus is computed. It will be appreciated in order to entertain the entire English vocabulary, about 60,000 words, a corpus of at several hundred trillion words must be used. Furthermore, a comparable number of probabilities must be stored on the computer. Thus the task of analyzing entire sentences is both computationally and storage intensive (Schabes Col. 8 lines 12-28).

Further, Schabes overcomes previous techniques, wherein rather than comparing the above mentioned probabilities, in a preferred embodiment, the subject system compares the geometric average of these probabilities by taking into account their word lengths, i.e. by comparing the logarithm of P1 divided by the number of words in S1, and the logarithm of P2 divided by the number of words in S2. This is important in cases where a single word may be confused with a sequence of words such as "maybe" and "may be". Directly comparing the probabilities of the part of speech sequences would favor shorter sentences instead of longer sentences, an not necessarily correct result, since the statistical language model assigns lower probabilities to longer sentences (Schabes Col. 9 lines 55-67).

Furthermore, Schabes teaches that in particular importance in grammar checking is the ability to detect the sequence of parts of speech as they exist in a given sentence. Correct sentences will have parts of speech which follow a normal sequence, such that by analyzing the parts of speech sequence one can detect the probability that the sentence is correct in terms of its grammar. While prior art systems have tagged a sentence for parts of speech and have analyzed the sequences of parts of speech for the above mentioned probability, these probability have never been utilized in grammar checking and correcting system (Schabes Col. 3 lines 14-25 & Fig. 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Brill to incorporate deriving a grammar being applicable to unknown sentences or unknown phrases as taught by Schabes to allow for the analysis of any input, particularly in any language and being able to not only translate but interpret the semantic and syntactic structure of discourse, wherein probabilities that check if grammar is correct based on a sequential sentence input (Schabes Col. 3 lines 14-25 & Fig. 1).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Colucci whose telephone number is (571)-270-1847. The examiner can normally be reached on 9:30 am - 6:00 pm, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571)-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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